

W. H. Brock's much larger edition published four years earlier (reviewed in *Isis*, 1986, 77:380–381). This editorial collaboration began when Heuser (Leverkusen, Federal Republic of Germany) and Zott (Berlin, German Democratic Republic) discovered that each had already independently worked through the relatively small but valuable cache of Liebig letters preserved in the Zentrales Archiv of the Akademie der Wissenschaften der DDR.

Published here for the first time are twenty-two letters from Liebig to Hofmann, one each from Liebig to Thomas Graham, F. L. Knapp, Helene Hofmann, the *Augsburger Allgemeine Zeitung*, and his son Georg, and a manuscript report by Liebig on the strychnine content of English beers. In addition, there is one new letter from Hofmann to Liebig and one from J. T. B. von Linde to Liebig; also printed here is a draft of a letter of consolation that Hofmann, as president of the *Deutsche Chemische Gesellschaft*, wrote to Liebig's widow. More than two thirds of the letters date from the first ten years of Hofmann's London period, 1845–1854.

To make it easy for readers to collate letters between the two editions, Heuser and Zott have adopted Brock's numbering system: as the first letter in this collection would have followed the twelfth in Brock's edition, it is labeled "12a," and so on. They have also followed many of Brock's careful editorial procedures, producing a craftsmanlike edition replete with a brief foreword, accurate and helpful footnotes, and a name index. Unsurprisingly, the letters reflect the same concerns (predominantly business, career, and personal matters) as the previously published letters. As a group, they fill in a number of the lacunae in the Brock edition, and their publication is to be warmly welcomed.

The correspondence of Liebig and Emil Erlenmeyer has a sharply different tone from the Liebig-Hofmann letters. Erlenmeyer was also a student of Liebig's, but he did not have Hofmann's personal connections to the master. Consequently, the letters on both sides are stiff, formal, and few, though not unfriendly. Heuser here publishes eight letters from Erlenmeyer to Liebig held in the Liebigiana collection of the Bayerische Staatsbibliothek, and seven letters from Liebig to Erlenmeyer formerly in the possession of one of Erlenmeyer's grandsons. The content of the correspon-

dence mostly concerns pharmaceutical and publishing matters; during this period Liebig was little interested in theoretical questions, and one sees nothing here of Erlenmeyer's intense concern with theory.

This collection also has been edited with care and is a valuable addition to the literature. The typography is in general accurate, but one mistake should be corrected. Heuser reproduces Erlenmeyer's curriculum vitae, composed in 1890, but with the same typographical transposition that appeared in Otto Krätz's exemplary edition of the correspondence of Erlenmeyer and Konrad Beilstein (1972): Erlenmeyer first arrived at the University of Giessen in 1845, not 1854. Oddly, the date is given correctly in Heuser's foreword.

A. J. ROCKE

J. G. O'Hara; W. Pricha. *Hertz and the Maxwellians: A Study and Documentation of the Discovery of Electromagnetic Wave Radiation, 1873–1894.* (IEE History of Technology Series, 8.) xiv + 154 pp., illus., indexes. London: Peter Peregrinus with the Science Museum, 1987. \$48.

The German physicist Heinrich Hertz discovered electromagnetic waves in the late 1880s, a discovery regarded as a major benchmark in the history of modern science. The centennial of this contribution has stimulated a number of observances, including a Hertz symposium in Karlsruhe in March 1988 and a special session at the International IEEE Microwave Meeting held in New York City in May 1988. An exhibit of Hertzian experimental apparatus on loan from the British Science Museum was featured at the latter symposium. Also, the IEEE has announced the creation of a new Heinrich Hertz Medal to be awarded annually beginning in 1989. Thus this book, containing correspondence between Hertz and contemporary British scientists and other documents relating to his discovery and its impact, is quite timely.

J. G. O'Hara and W. Pricha include a prologue of several pages in which they examine the interaction of Hertz and the British Maxwellians and its effect on his work. They devote one chapter to the exchange of letters between Hertz and George F. Fitzgerald during the period from June 1888 to February 1892. The letters from Hertz are given both in the original German and

in English translation, along with editorial commentary. This correspondence helps to illuminate the troubling issue of correlating theory with empirical data on the velocity of wave propagation along wires.

A second chapter deals with Hertz and Oliver Heaviside and their correspondence from February 1889 to December 1890. Unfortunately, this material is limited to one side of the exchange, since the Hertz letters responding to Heaviside were not found except for some previously published extracts. Among topics discussed was the effort by Heaviside to simplify the mathematics of Maxwell's analysis by the adoption of vector analysis as an alternative to quaternions. Readers who are interested in this and other aspects of Heaviside's work should consult Paul J. Mahin's recently published biography of Heaviside (IEEE Press, 1988), where a full chapter is devoted to the "great quaternionic war."

O'Hara and Pricha devote a chapter to Hertz and Oliver J. Lodge, who corresponded from September 1888 to January 1891. Another chapter concerns William Thomson, who wrote a preface for the English translation of Hertz's book, although apparently they never corresponded directly. A final chapter has correspondence related to Hertz's visit to London and Cambridge in November 1890. The book also contains information on the location of surviving manuscript papers and letters of Hertz and a series of plates depicting Hertz apparatus preserved at the Deutsches Museum.

JAMES E. BRITAIN

Michael John Petry (Editor). *Hegel und die Naturwissenschaften*. (Spekulation und Erfahrung: Texte und Untersuchungen zum Deutschen Idealismus, Abteilung II: Untersuchungen, 2.) 562 pp., bibls., index. Stuttgart-Bad Cannstatt: Frommann-Holzboog, 1987. DM 128.

In October 1983 the Philosophisches Seminar in Tübingen, in collaboration with the Istituto Italiano per gli Studi Filosofici in Naples, sponsored a colloquium on G. W. F. Hegel and the natural sciences. Hegel, we are told by the editor of the collection of essays derived from the conference, always stood ready to correct his system in light of the changing data of natu-

ral science. The contributions to this volume, however, are concerned not so much with Hegel and the practice of natural science as with Hegel's philosophy of nature. The title of the book was selected to avoid any direct association with F. W. J. Schelling's *Naturphilosophie*.

Not all of the essays are of primary interest to historians. One third of the volume deals with the relevance of the Hegelian perspective to philosophical questions in mathematics. Of the essays devoted to issues in mathematics, that by Louis Eduard Fleischhacker is most clearly tied to Hegel's own thought. Fleischhacker's concern is to explain in what sense a mathematical natural science was possible for Hegel. Hegel understood mathematics as a science that was complete in itself but that nevertheless had a relation to the real world. According to Hegel, we grasp merely the *principle* of quantity through abstraction from the sense world, and that enables us to reconstruct the quantitative framework of the world of perception. But we understand more of the world than we can express mathematically.

In another contribution Konrad Geiser explains how the agreement between the Platonic and the Hegelian views of the spiritual origin (*geistiger Ursprung*) of external nature resulted for both in a compatibility between the realms of nature and ethics. As in the recent volume *Goethe and the Sciences*, edited by Frederick Amrine, Francis J. Zucker, and Harvey Wheeler (reviewed in *Isis*, 1987, 78:638-639), one hears the claim that an "ecological" natural science offers an alternative to the tradition in which nature can only be an object.

Among the most intriguing contributions are those of Dieter Wandschneider of Tübingen, who analyzes the categories of matter, gravitational force, and light in Hegel's thought and then discusses the origin of psychical being in the philosophy of nature. His most stimulating piece, however, is a study of the place of nature in the overall scheme of Hegel's philosophy.

Wandschneider laments the "scandalous" lack of a genuine philosophy of nature in contemporary philosophy, a deficiency he attributes to the historical emphasis since Descartes on epistemological at the expense of ontological treatments of nature. Wandschneider shows how the tripartite structure of Hegel's system, focus-